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# United States Department of Agriculture,

OFFICE OF THE SECRETARY.

WASHINGTON, D. C.

## COOPERATIVE LABORATORY AT RENO, NEV., FOR THE EXAMINATION OF POTASH-BEARING MATERIALS.

### INFORMATION FOR PROSPECTORS.

As an adjunct to the investigation of the fertilizer resources, and especially to the search for potash in the United States now being conducted by Government agencies, there has been established at the Mackay School of Mines, Reno, Nev., a laboratory for the examination of natural material suspected of containing potash. The laboratory has been organized under a cooperative agreement between the Mackay School of Mines, the Bureau of Soils of the United States Department of Agriculture, and the United States Geological Survey. The laboratory is in charge of Prof. George J. Young, of the Mackay School of Mines, with Mr. A. R. Merz, of the Bureau of Soils, as chemist. Facilities have been provided for the examination and assay of potash-bearing materials, and of saline waters and minerals. It will be possible, also, to examine a limited number of samples for contained nitrates.

Samples of suspected potash or nitrate bearing materials will be examined free of charge for prospectors and others, so far as limitations of time and equipment of the laboratory will permit, but all samples must be accompanied by the following information:

1. The name and post-office address of the owner, locator, or discoverer of the deposit.
2. The exact location from which the sample was obtained.
3. A description of the material and its surroundings, and of the manner of taking the sample.

This information, or any part of it, will be kept confidential if so requested. However, it should be noted that the laboratory does not agree to make complete analyses or to make quantitative assays, except as rendered by the result of qualitative tests. In all cases,

however, it is the intention to make such assays and examinations as will determine the potash or nitrate value alone of the material represented by the sample.

All samples should be addressed to: Cooperative Laboratory, Mackay School of Mines, Reno, Nev. Dry samples should be at least one-half pound in weight, should be securely wrapped and tied, and marked with the name and address of the sender. Samples of brines or water should be placed in clean bottles of at least 1 quart capacity, stoppered with clean corks securely tied in, and should be well packed against breakage. In all cases all transportation charges must be prepaid.

For the information of prospectors there is appended the following brief account of the nature of potash salts and their occurrence:

Potash occurs in nature in two classes of compounds, those soluble in water and those insoluble therein. Insoluble compounds, such as alunite, leucite, certain feldspars, and various other minerals, may prove of value as a source of potash, but as yet no process has been developed for the successful commercial extraction of potash from these materials, excepting possibly in the case of alunite, which is used in Italy as a source of potash alum. The cooperative laboratory does not agree to examine such insoluble materials.

The soluble potash compounds, which are the only ones of present commercial value, include potassium nitrate or niter, potassium sulphate, potassium chloride, and various double salts of potassium with other elements, notably kainite, a compound of potassium chloride and magnesium sulphate; and "manure salts," a variable mixture of chlorides and sulphates of potassium, sodium, magnesia, etc., containing from 15 to 40 per cent of potash. The supply of all these materials is now obtained from Germany, excepting potassium nitrate, which comes mainly from India, and the present values on the Atlantic seaboard are approximately as follows, all being expressed in dollars per ton of 2,000 pounds:

Potassium nitrate or niter, about.....	\$65
Potassium sulphate, about.....	45
Potassium chloride, about.....	35
Kainite, about.....	8
Manure salts, about.....	13

The value of any natural material containing soluble potash salts will depend upon the percentage of potash and upon the other materials, especially the other soluble salts which are present and from which the potash must be separated. Materials which do not contain too large proportions of these other salts, and in which the potash occurs as salts other than nitrate, will be worth from 50 cents to \$1 per per cent of potash per ton. Similar materials containing

potassium nitrate will be worth 75 to 100 per cent more. The decision as to whether any particular material can be profitably worked will depend upon so many special and local conditions that no general statements can be made.

Among the possible places of occurrence of soluble potash salts within the United States are the inclosed basins of the western deserts. Ordinary surface waters usually carry small quantities of potash, and, since these basins have no outlet to the sea, any potash salts which have been carried into them by streams must still be there. It is conceivable that in some of these basins workable deposits of soluble potash salts may have accumulated either on the present surface or in the beds which underlie it. The latter possibility is being tested in one of the basins by the well now being drilled by the United States Geological Survey near Fallon, Nev., as described by H. S. Gale in Bulletin 530-A of the Geological Survey. In addition to this, the surface conditions in other basins are being examined by agents of the Bureau of Soils and of the Geological Survey, and the indications for or against the occurrence of potash are being studied. A preliminary report of the fertilizer resources of the United States containing a discussion of available surveys of potash salts will be found in Document No. 190, United States Senate, Sixty-Second Congress, second session.

If potash occurs on the surface of any of these undrained basins it is doubtless associated with the saline materials of various kinds usually found on and underneath the central sink or playa. Its presence therein will probably be detectable by examination of the salts of this playa or of saline springs in and about it. Such springs may also furnish information as to possible potash deposits in the deeply buried beds.

The identification of potash in the field is by no means easy, since the other salts with which it is associated usually mask its peculiarities. The best general field test is conducted as follows: A fragment of the suspected material is moistened with potash-free water, placed on a platinum wire or strip, and inserted in the flame of an alcohol lamp or other lamp the flame of which is colorless, the flame being at the same time observed through a piece of blue glass of a special kind, known as cobalt glass. If any considerable quantity of potash is present it will give to the flame thus viewed a peculiar violet color, which is quite characteristic and easily recognized after once being seen. The platinum wire, alcohol lamp, and cobalt glass employed in this test can be secured from any dealer in chemical supplies. By the use of a spectroscope the delicacy and accuracy of this test can be somewhat increased, but the spectroscope is both expensive and difficult to operate, and it can not be recommended to persons inex-

perienced in its use. Potash salts of high purity can be recognized by taste, but those occurring in nature are usually so impure that the taste ceases to be characteristic. Interested prospectors are advised to procure the materials for the flame test and become proficient in its use, and to retain for chemical analysis any samples which give the potash color.

Approved.

JAMES WILSON,  
*Secretary of Agriculture.*

JANUARY 24, 1912.